

Appl. No. 09/976,927
Amdt. dated May 23, 2003
Reply to Office Action of February 26, 2002

PATENT

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1-28. Canceled.

D¹ 29. (New) A semiconductor device comprising:

- (a) a substrate;
- (b) a diffusion barrier layer, wherein the diffusion barrier layer comprises a self-assembled monolayer, wherein the self-assembled monolayer is a single layer of molecules, and wherein the molecules in the self-assembled monolayer have first ends attached to the substrate and second ends projecting upward from the substrate; and
- (c) a metal layer comprising copper on the diffusion barrier layer, wherein the copper in the metal layer is in direct contact with the second ends of the molecules in the self-assembled monolayer.

30. (New) The semiconductor device of claim 29 wherein the device is capable of being biased at about 2 MV/cm at about 200 °C for about 30 minutes without diffusion of the copper into the substrate.

31. (New) The semiconductor device of claim 29 wherein the substrate comprises silicon oxide on silicon.

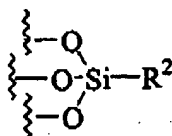
32. (New) The semiconductor device of claim 29 wherein the molecules have aromatic groups at the first ends of the molecules.

33. (New) The semiconductor device of claim 29 wherein the metal layer is formed by a sputtering process.

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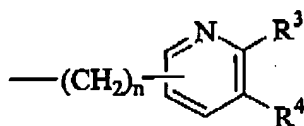
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34. (New) The semiconductor device of claim 29, wherein the molecules comprise subunits of the following structure:



wherein R^2 is an alkyl group, heteroalkyl group, aryl group or heteroaryl group.

35. (New) The semiconductor device of claim 34, wherein R^2 has the following structure:



wherein R^3 and R^4 are independently selected from the group consisting of hydrogen, alkyl groups, heteroalkyl groups, halo groups, NH_2 , NHR^6 , NR^6R^7 , OH , OR^6 , SH , SR^6 , CHO , COOH and CN , and wherein R^6 and R^7 are alkyl groups, and wherein n is an integer ranging from 1 to 5.

36. (New) The semiconductor device of claim 29 wherein the semiconductor device is an integrated circuit.